Network Security Physical Layer

Target Course

Networks

Learning Goals

A student shall be able to:

1. Describe foundational security concepts in securing networks and systems.
2. Describe security design principles and identify security issues associated with common threats and attacks.

IAS Outcomes

IAS Knowledge Topic	Outcome
Network Security	3. Describe virtues and limitations of security technologies at each layer of the network stack. [Familiarity]

Dependencies

- Cover after the **Network Security Concepts** module.

Summary

Describe how the physical layer may be used to support the security goals of CIA and the fundamental concepts of assurance, authentication, anonymity, and non-repudiation.

Estimated Time

This module takes approximately 15 lecture minutes to cover.

Materials

How does this layer affect the security goal of confidentiality?

- Transmission media are responsible for transmitting bits across a medium. The concept of confidentiality is not within the context of their design.

How does this layer affect the security goal of integrity?

- Some transmission media (e.g., fiber optics) are immune to electromagnetic interference.
- However, the link layer is responsible for ensuring the integrity of bits being sent and received.

How does this layer affect the security goal of availability?

- Transmission media are responsible for transmitting bits across a medium. Each type of media has its own set of performance characteristics.
- The link layer is responsible to knowing when the transmission media is available for use. The concept of availability is not within the context of the design of transmission media.

How does this layer affect the fundamental security concept of assurance?

- Some types of transmission media (e.g., radio waves) are inherently less trustworthy since they are transmitted over the air and thus prone to interception and potentially rebroadcast.

How does this layer affect the fundamental security concept of authenticity?

- The concept of authenticity is not within the context of the design of transmission media.

How does this layer affect the fundamental security concept of anonymity?

- The physical media has no understanding of user identity.

How does this layer affect the fundamental security concept of non-repudiation?

- Since the physical layer has no notion of user identity, non-repudiation is not supported.

What are the common types of transmission media?

- Twisted-pair copper wire
- Coaxial cable
- Fiber optics
- Terrestrial radio channels (e.g., electromagnetic spectrum)
- Satellite radio channels (e.g., microwave point-to-point)

What type of risks are known about the Physical layer?

The information below is from Chapter 14 in [1] and Chapter 1 in [2].

The Physical layer general risks include the following:

Assessment Methods

None used.

References

None.